

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (currently amended): A method for fabricating a magnetic head including a spin valve sensor, comprising the steps of:

fabricating a first electrical insulation layer (G1) above a first magnetic shield layer (S1);  
fabricating a plurality of spin valve sensor layers above said G1 layer, said spin valve sensor layers including a seed layer, a PtMn antiferromagnetic layer, at least one pinned magnetic layer and at least one free magnetic layer;

wherein said seed layer is a three part seed layer comprised of  $\text{Al}_2\text{O}_3$ , NiMnO and NiFeCr, and wherein said NiFeCr seed layer has a rough top crystallographic surface that is rougher than a top crystallographic surface of a deposited NiFeCr seed layer.

2. (currently amended): A method for fabricating a magnetic head as described in claim 1 wherein said NiFeCr seed layer portion is fabricated to have a thickness of approximately 20 Å, and wherein said rough top crystallographic surface is formed by etching a previously deposited NiFeCr top surface.

3. (original): A method for fabricating a magnetic head as described in claim 1 wherein said spin valve sensor layers include at least one pinned magnetic layer having a composition including CoFe and at least one spacer layer having a composition including Cu, and at least one free magnetic layer having a composition including NiFe.



1 4. (original): A method for fabricating a magnetic head as described in claim 1 wherein the  
2 Cr concentration of said NiFeCr layer is from approximately 35 at.% to approximately 46 at.%.

1 5. (original): A method for fabricating a magnetic head as described in claim 4 wherein the  
2 Cr concentration of said NiFeCr layer is approximately 38 at.%.

1 6. (original): A method for fabricating a magnetic head as described in claim 5 wherein the  
2 composition of said NiFeCr layer is approximately  $\text{Ni}_{49.5} \text{Fe}_{12.5} \text{Cr}_{38}$ .

1 7. (withdrawn): A method for fabricating a magnetic head including a spin valve sensor,  
2 comprising the steps of:

3 fabricating a first electrical insulation layer (G1) above a first magnetic shield layer (S1);  
4 fabricating a plurality of spin valve sensor layers above said G1 layer, said spin valve  
5 sensor layers including a seed layer, a PtMn antiferromagnetic layer, at least one pinned  
6 magnetic layer and at least one free magnetic layer;

7 wherein said seed layer is comprised of  $\text{Al}_2\text{O}_3$ , NiMnO, NiFeCr layer portions, and  
8 wherein said NiFeCr layer is fabricated by depositing it to a first thickness and subsequently  
9 etching it back to a final thickness before the fabrication of said PtMn layer.

1 8. (withdrawn): A method for fabricating a magnetic head as described in claim 7 wherein  
2 said NiFeCr layer is fabricated to have a final thickness of from approximately 10 Å to  
3 approximately 40 Å.



1 9. (withdrawn): A method for fabricating a magnetic head as described in claim 8 wherein  
2 said NiFeCr seed layer is fabricated to have a final thickness of from approximately 15 Å to  
3 approximately 35 Å.

1 10. (withdrawn): A method for fabricating a magnetic head as described in claim 9 wherein  
2 said NiFeCr layer is fabricated to have a final thickness of approximately 20 Å.

1 11. (withdrawn): A method for fabricating a magnetic head as described in claim 7 wherein  
2 said first thickness of said NiFeCr layer is from approximately 15 Å to approximately 45 Å and  
3 it is etched back a thickness of from approximately 5 Å to approximately 15 Å.

1 12. (withdrawn): A method for fabricating a magnetic head as described in claim 11 wherein  
2 said first thickness is approximately 30 Å and said final thickness is approximately 20 Å.

1 13. (withdrawn): A method for fabricating a magnetic head as described in claim 7 wherein  
2 said spin valve sensor layers include at least one pinned magnetic layer having a composition  
3 including CoFe and at least one spacer layer having a composition including Cu, and at least one  
4 free magnetic layer having a composition including NiFe.

1 14. (withdrawn): A method for fabricating a magnetic head as described in claim 7 wherein  
2 the Cr concentration of said NiFeCr layer is from approximately 35 at.% to approximately 46  
3 at.%.



1 15. (withdrawn): A method for fabricating a magnetic head as described in claim 14 wherein  
2 the Cr concentration of said NiFeCr layer is approximately 38 at.%.

1 16. (withdrawn): A method for fabricating a magnetic head as described in claim 15 wherein  
2 the composition of said NiFeCr layer is approximately  $\text{Ni}_{49.5} \text{Fe}_{12.5} \text{Cr}_{38}$ .

1 17. (withdrawn): A method for fabricating a magnetic head as described in claim 7 wherein  
2 said first thickness is from 15 to 45 Å, and it is etched back a thickness of from 5 to 15 Å, and  
3 wherein the Cr concentration of said NiFeCr layer composition is from approximately 35 at.% to  
4 approximately 46 at.%.

1 18. (currently amended): A magnetic head including a spin valve sensor comprising:  
2 a magnetic shield layer (S1) being fabricated above a substrate base;  
3 a first electrical insulation layer (G1) being fabricated above said S1 layer;  
4 a spin valve sensor structure being disposed above said G1 layer;  
5 wherein said spin valve sensor structure includes a seed layer being fabricated above said  
6 G1 layer, a PtMn layer being disposed above said seed layer and at least one pinned magnetic  
7 layer and at least one free magnetic layer being disposed above said PtMn layer; and  
8 wherein said seed layer includes an  $\text{Al}_2\text{O}_3$  layer, an NiMnO layer, and an NiFeCr layer,  
9 and wherein said NiFeCr seed layer has a rough top crystallographic surface that is rougher than  
10 a top crystallographic surface of a deposited NiFeCr seed layer.



1 19. (original): A magnetic head as described in claim 18 wherein said NiFeCr layer is  
2 formed with a thickness of approximately 20 Å.

1 20. (original): A magnetic head as described in claim 18 wherein the Cr concentration of  
2 said NiFeCr layer is from approximately 35 at.% to approximately 46 at.%.

1 21. (original): A magnetic head as described in claim 19 wherein the Cr concentration of  
2 said NiFeCr layer is approximately 38 at.%.

1 22. (original): A magnetic head as described in claim 21 wherein the composition of said  
2 NiFeCr layer is approximately Ni<sub>49.5</sub> Fe<sub>12.5</sub> Cr<sub>38</sub>.

1 23. (currently amended): A magnetic head including a spin valve sensor comprising:  
2 a magnetic shield layer (S1) being fabricated above a substrate base;  
3 a first electrical insulation layer (G1) being fabricated above said S1 layer;  
4 a spin valve sensor structure being disposed above said G1 layer;  
5 wherein said spin valve sensor structure includes a seed layer being fabricated above said  
6 G1 layer, a PtMn layer being disposed above said seed layer and at least one pinned magnetic  
7 layer and at least one free magnetic layer being disposed above said PtMn layer; and  
8 wherein said seed layer ~~has an upper surface~~ comprised of NiFeCr having ~~an etched~~  
9 ~~crystalline structure~~ a rough top crystallographic surface that is rougher than a top  
10 crystallographic surface of a deposited NiFeCr seed layer.



1 24. (original): A magnetic head as described in claim 23 wherein said NiFeCr layer is  
2 formed with a thickness of from approximately 10 Å to approximately 40 Å.

1 25. (original): A magnetic head as described in claim 23 wherein said NiFeCr seed layer is  
2 formed with a thickness of from approximately 15 Å to approximately 35 Å.

1 26. (original): A magnetic head as described in claim 23 wherein said NiFeCr layer is  
2 formed with a thickness of approximately 20 Å.

1 27. (original): A magnetic head as described in claim 23 wherein the Cr concentration of  
2 said NiFeCr layer is from approximately 35 at.% to approximately 46 at.%.

1 28. (original): A magnetic head as described in claim 27 wherein the Cr concentration of  
2 said NiFeCr layer is approximately 38 at.%.

1 29. (original): A magnetic head as described in claim 28 wherein the composition of said  
2 NiFeCr layer is approximately  $\text{Ni}_{49.5} \text{Fe}_{12.5} \text{Cr}_{38}$ .

1 30. (original): A magnetic head as described in claim 23 wherein said spin valve sensor  
2 structure includes at least one PtNm antiferromagnetic layer, at least one pinned magnetic layer  
3 having a composition which includes CoFe, at least one spacer layer having a composition which  
4 includes Cu, and at least one free magnetic layer having a composition which includes NiFe.



1 31. (currently amended): A hard disk drive, including at least one magnetic head having a  
2 read head portion comprising:

3 a magnetic shield layer (S1) being fabricated above a substrate base;

4 a first electrical insulation layer (G1) being fabricated above said S1 layer;

5 a spin valve sensor structure being disposed above said G1 layer;

6 wherein said spin valve sensor structure includes a seed layer being fabricated above said  
7 G1 layer, a PtMn layer being fabricated above said seed layer and at least one pinned magnetic  
8 layer and at least one free magnetic layer; and

9 wherein said seed layer includes an  $\text{Al}_2\text{O}_3$  layer, an NiMnO layer and an NiFeCr layer,  
10 and wherein said NiFeCr seed layer has a top surface with a rough crystallographic surface that  
11 is rougher than a top crystallographic surface of a deposited NiFeCr seed layer.

1 32. (original): A hard disk drive as described in claim 31 wherein said NiFeCr layer has a  
2 thickness of approximately 20 Å.

1 33. (original): A hard disk drive as described in claim 31 wherein the Cr concentration of  
2 said NiFeCr layer is from approximately 35 at.% to approximately 46 at.%.

1 34. (original): A hard disk drive as described in claim 33 wherein the Cr concentration of  
2 said NiFeCr layer is approximately 38 at.%.

1 35. (original): A hard disk drive as described in claim 34 wherein the composition of said  
2 NiFeCr layer is approximately  $\text{Ni}_{49.5}\text{Fe}_{12.5}\text{Cr}_{38}$ .



1 36. (currently amended): A hard disk drive, including at least one magnetic head having a  
2 read head portion comprising:

3 a magnetic shield layer (S1) being fabricated above a substrate base;

4 a first electrical insulation layer (G1) being fabricated above said S1 layer;

5 a spin valve sensor structure being disposed above said G1 layer;

6 wherein said spin valve sensor structure includes a seed layer being fabricated above said  
7 G1 layer, a PtMn layer being fabricated above said seed layer and at least one pinned magnetic  
8 layer and at least one free magnetic layer; and

9 wherein said seed layer has an upper surface comprised of NiFeCr having ~~an etched~~  
10 ~~crystalline structure~~ a rough top crystallographic surface that is rougher than a top  
11 crystallographic surface of a deposited NiFeCr seed layer.

1 37. (original): A hard disk drive as described in claim 36 wherein NiFeCr seed layer is  
2 formed with a thickness of from approximately 10 Å to approximately 40 Å.

1 38. (original): A hard disk drive as described in claim 36 wherein said NiFeCr seed layer is  
2 formed with a thickness of from approximately 15 Å to approximately 35 Å.

1 39. (original): A hard disk drive as described in claim 36 wherein said NiFeCr layer is  
2 formed with a thickness of approximately 20 Å.

1 40. (original): A hard disk drive as described in claim 36 wherein the Cr concentration of  
2 said NiFeCr layer is from approximately 35 at.% to approximately 46 at.%.



1 41. (original): A hard disk drive as described in claim 40 wherein the Cr concentration of  
2 said NiFeCr layer is approximately 38 at.%.  
3

1 42. (original): A hard disk drive as described in claim 41 wherein the composition of said  
2 NiFeCr layer is approximately  $\text{Ni}_{49.5} \text{Fe}_{12.5} \text{Cr}_{38}$ .  
3

1 43. (original): A hard disk drive as described in claim 36 wherein said spin valve sensor  
2 structure includes at least one PtNm antiferromagnetic layer, at least one pinned magnetic layer  
3 having a composition which includes CoFe, at least one spacer layer having a composition which  
4 includes Cu, and at least free magnetic layer having a composition which includes NiFe.  
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